Title: Multiple Bar Works

Brief Overview:

In this unit students are participants in the SweetPea Candy Contest. Students are challenged to create a new candy bar and persuade the company president that their bar should be selected as the winner. To accomplish this students complete a variety of tasks. The assigned tasks focus on the following skills:

Problem solving
Data collection and analysis
Converting and comparing fractions, decimals, and percentages
Written communication using math language

NCTM 2000 Principles for School Mathematics:

Equity: *Excellence in mathematics education requires equity - high expectations and strong support for all students.*

Curriculum: *A curriculum is more than a collection of activities: it must be coherent, focused on important mathematics, and well articulated across the grades.*

Teaching: *Effective mathematics teaching requires understanding what students know and need to learn and then challenging and supporting them to learn it well.*

Learning: *Students must learn mathematics with understanding, actively building new knowledge from experience and prior knowledge.*

Assessment: *Assessment should support the learning of important mathematics and furnish useful information to both teachers and students.*

Technology: *Technology is essential in teaching and learning mathematics; it influences the mathematics that is taught and enhances students' learning.*

Links to NCTM 2000 Standards:

Content Standards

<u>Number and Operations</u>

Understand numbers, ways of representing numbers, relationships among numbers, and number systems.

Compute numbers fluently and make reasonable estimates.

<u>Algebra</u>

Use mathematical models to represent and understand quantitative relationships.

Measurement

Understand measurable attributes of objects and the units, systems, and processes of measurement. Measurement is the assignment of a numerical value to an attribute of an object.

Data Analysis and Probability

Select and use appropriate statistical methods to analyze data.

Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them.

Process Standards

Problem Solving

Build new mathematical knowledge through problem solving.

Solve problems that arise in mathematics and in other contexts.

Apply and adapt a variety of appropriate strategies to solve problems.

Monitor and reflect on the process of mathematical problem solving.

Reasoning and Proof

Recognize reasoning and proof as fundamental aspects of mathematics.

Develop and evaluate mathematical arguments and proofs.

Select and use various types of reasoning and methods of proof.

Communication

Organize and consolidate their mathematical thinking though communication.

Communicate their mathematical thinking coherently and clearly to peers, teachers, and others.

Analyze and evaluate the mathematical thinking and strategies of others.

Use the language of mathematics to express mathematical ideas precisely.

Connections

Recognize and use connections among mathematical ideas.

Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.

Recognize and apply mathematics in contexts outside of mathematics.

Representation

Create and use representations to organize, record, and communicate mathematical ideas.

Select, apply, and translate among mathematical representations to solve problems.

Use representations to model and interpret physical, social, and mathematical phenomena.

Grade/Level:

Grades 3 - 5
Inclusion and Special Education Up to Grades 5-6

Duration/Length:

This unit will take approximately 5 sixty minutes periods.

Prerequisite Knowledge:

Students should have working knowledge of the following skills:

Frequency tables and line plots.
Conversion of fractions, decimals, and percentages.
Comprehension of the hundreds chart.
Multiplication of percentage with decimal numbers.
Writing a business letter.

Student Outcomes:

Students will:

Conduct, analyze, and interpret a survey.
Construct a line plot or a frequency table.
Write a business letter.
Calculate cost of production of a product.
Explain and illustrate how to convert fractions, decimals, and percentages into their equalivalent parts.
Construct a graph using the hundreds chart.
Create an advertising brochure (media or hand).

Materials/Resources/Printed Materials:

Student Resource Sheets # 1 - 8
Teacher Resource Sheets # 1 - 11
Scoring Rubrics 1 - 8

Butcher paper
Markers
Colored pencils or crayons
Various art supplies or media capability for brochure creation
Base 10 manipulatives

Development/Procedures:

Day 1

Daily Reflection

Teacher Resource Sheets # 1- 5

2. Opening Vignette
   Teacher Resource Sheet # 1 (Project Introduction)
2. Review frequency tables, line plots, and conversions.
   Teacher Resource Sheets # 2-5

Daily Procedures

Student Resource Sheets # 1 - 3

Scoring Rubrics 1 and 3. Display a transparency of Teacher Resource Sheet # 1.

1. The teacher tells the students the SweetPea Candy Company has announced a contest. In order to win, students must design a candy bar and convince the president that theirs is the best by writing a letter and creating a brochure.
2. The teacher will assign students to a cooperative group containing 2 to 3 students; groups should be arranged in a high, medium, low format.
3. As a group, students will brainstorm 5 – 10 minutes to generate a list of possible names for their candy bar. This can be done using butcher paper and markers.
4. Groups will then select three names, which will be utilized on a survey. The survey will be used to determine the final name selection of the candy bar.
5. The three name choices will be placed on Student Resource Sheet # 1.
6. Students will complete their survey by interviewing 10 students from any class. (NOTE: Prior approval for class visit will need to be arranged in advance.)
7. Groups will record data from the survey on Students Resource Sheet # 1.
8. Using the data from the survey, students will finish completing Student Resource Sheet # 1.
9. Students will complete Student Resource Sheet # 2 choosing between creating a frequency table, bar graph, or line plot.
10. All students must complete conversions of data collected into decimals, fractions, and percentages. Students must justify calculation process in writing using Student Resource Sheet # 3.

Groups will share their selected group names with their classmates.

Day 2

Daily Reflection

Teacher Resource Sheets # 6 – 8

1. Review converting percentages to decimals and multiplying 2 decimals.
2. Review completing hundreds chart.

Daily Procedures

Student Resource Sheets # 4 – 6

Scoring Rubrics 4 - 5

1. Students will complete Student Resource Sheet # 4.
2. Students will determine if the fractional, decimal, and percentage amounts from Student Resource Sheet # 4 are equivalent. Students will illustrate their answers utilizing Student Resource Sheet # 5.
3. Students will justify their conclusion in written form using math language Student Resource Sheet # 6.
4. Groups will share their candy ingredients and cost for production with the class.

Performance Assessment:

Day 3

Daily Reflection

Teacher Resource Sheets # 9-10

1. Review business letter format

Daily Procedures

Student Resource Sheet # 7

Scoring Rubric 6

1. Individuals will write a business letter to the president of the SweetPea Candy Company. Students will tell the name of their candy bar justifying their decision, utilizing mathematical language, data, and reasoning. Use Student Resource Sheet # 7.

2. Individuals will need to include the following information in their business letter (remind students to use appropriate math language):

    Name of candy
    Type and amount of ingredients
    Cost of Production
    Fraction, decimal, and percentage equivalents

3. Students will share their letters with the class.

Day 4 and 5

Daily Reflections

Teacher Resource Sheet # 11

1. Review Components of the brochure to include:
    Advertising Slogan
    Name of candy bar
    Illustrations
    Candy bar components
    Cost of production of candy bar

Daily Procedures

Student Resource Sheet # 8

Scoring Rubrics 7 - 8

1. Students will create an advertising brochure - see Student Resource Sheet # 8. This could be done using a multi media program or on paper using various craft supplies.
2. Each group will present their brochures to the class.

3. Each group will formulate and direct questions to other groups about their publications.

Extension/Follow Up:

Contact a variety of candy companies to ask for donations to have an end of the unit party.

Change the food ingredients to positive character traits to create a cross curriculum math and character education unit.

Instead of using the hundred s charts to create the illustration of the candy bar students could use fraction bars.

Students could reduce the fractions to increase the level of difficulty.

Have students research different candy companies to discover their process for selecting new candy products.

Have students make candy in class using chocolate bark (Teachers should melt the chocolate bark in advance. In order for the chocolate to set use paraffin wax.)

Use different types of graphs to illustrate data.

Have students create a wrapper for their candy bar and calculate the size of the wrapper.

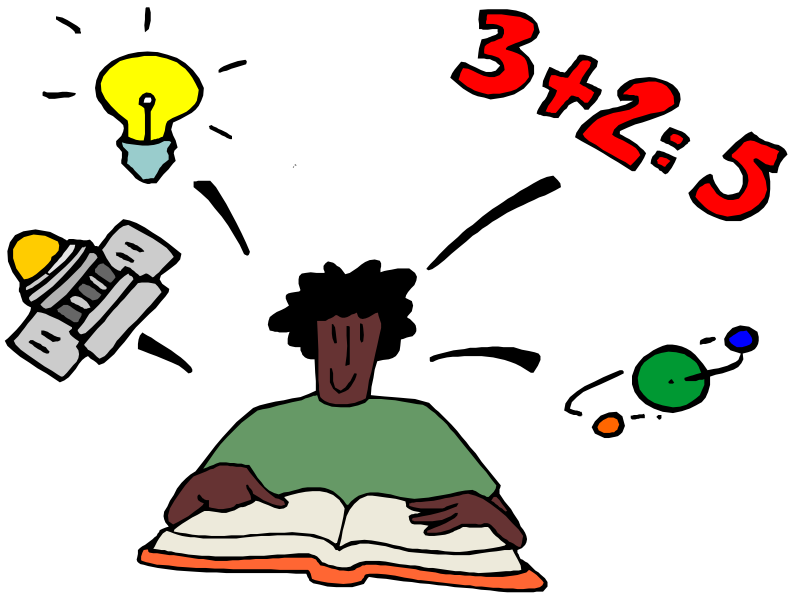
Authors:

Name **Angela Houf**
School **Wood Middle School**
County/Jurisdiction **Waynesville RVI**
Waynesville, Missouri

Name **Tina Easton**
School **Wood Middle School**
County/Jurisdiction **Waynesville RVI**
Waynesville, Missouri

Name **Thomas Boyce**
School **Hunters Woods Elementary**
County/Jurisdiction **Fairfax County, Virginia**

Student Resource Sheet



Brainstorming for Data!

As a group your first task in the SweetPea Candy Contest is to brainstorm and select three possible names for your candy bar. Following your brainstorm activity, complete the following tasks.

Candy bar name options from brainstorm activity:

_____

_____

_____

Use the table below to gather student survey data. Be sure to include a label for the table and appropriate column headings.

State the name based on your group's data for your candy bar and justify your answer.

_____

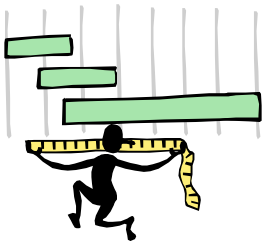
_____

_____

_____

_____

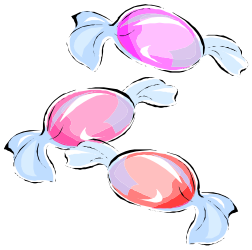
Data Dilemma!



Please display your survey data using either a frequency table, line plot, or a bar graph.

(**Note: Be sure to include all required information**)

IT'S ALL IN THE NAME!



In the chart below convert your survey data into fraction, decimal, and percentage equivalents.

	Choice 1	Choice 2	Choice 3
Fraction			
Decimal			
Percentage			

Using your data chart please justify how you converted the survey data to fractions, decimals, and percentages.

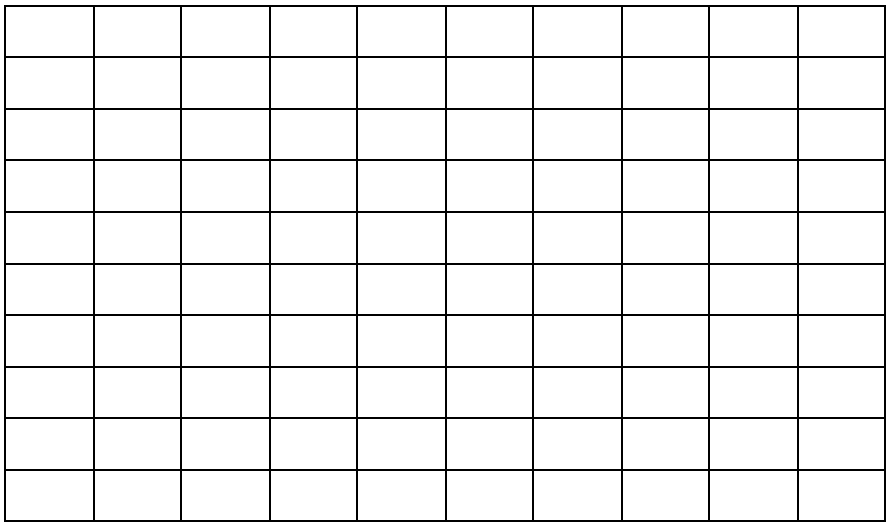
WHAT'S IN IT?

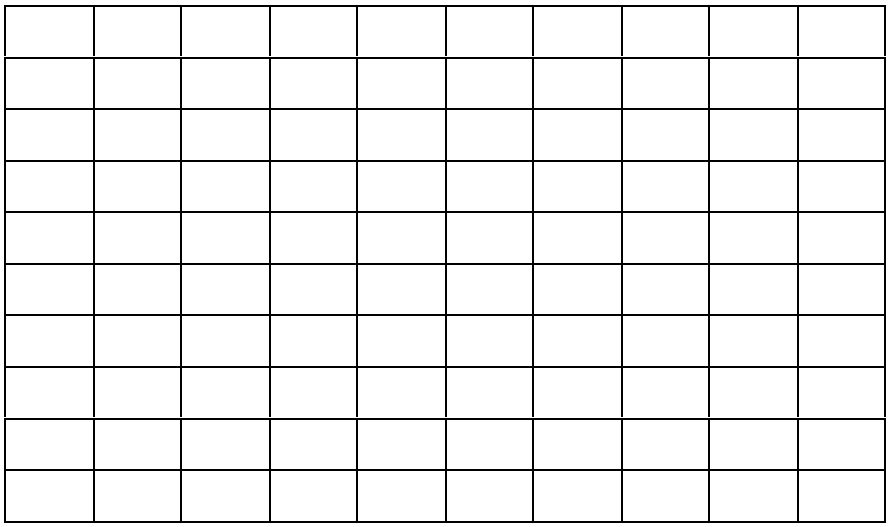
Select the ingredients you want in your candy bar. List the percentage of each ingredient in the correct column. Remember your ingredients should total 100%. You will then calculate the fraction and decimal equivalents. After calculating equivalents figure the cost per ingredient. The final task is to calculate the total cost of bar production.

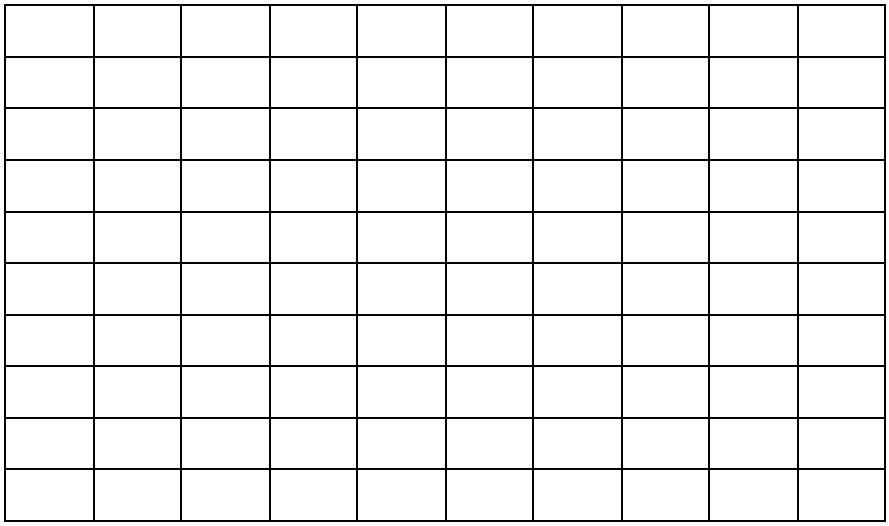
Ingredients	Percentage of Ingredient in bar	Fraction Equivalent	Decimal Equivalent	Price per One Percent	Total Cost Per Ingredient
Chocolate				$1.00	
White Chocolate				$.80	
Caramel				$.75	
Coconut				$.60	
Peanut Nuts				$.50	
Peanut Butter				$.45	
Almonds				$. 40	
Strawberry Crème Filling				$.30	

Total cost of bar production: _____

Justify your answers by showing all calculations.







Utilize the given charts to determine by illustration, if the fractional, decimal and percentage amounts, from your ingredient data is equivalent.

Is It Equivalent?

Equivalencies in Writing

Use the space below to answer the question, **“ Are the fractional, decimal, and percentage amounts from your ingredient data equivalent? ”** Justify your answer in paragraph form utilizing information from your charts. Remember to use mathematical language in your writing.

Tell Me About It!

Write a business letter to the SweetPea Candy Company that would convince the company president to select your candy bar. Please include the following information:

- Name of the candy bar and name selection process
- Type and amount of ingredients
- Cost of production
- Fraction, decimal, and percentage equivalents

- See scoring rubric for business letter scoring information.
- Neatness and format count!

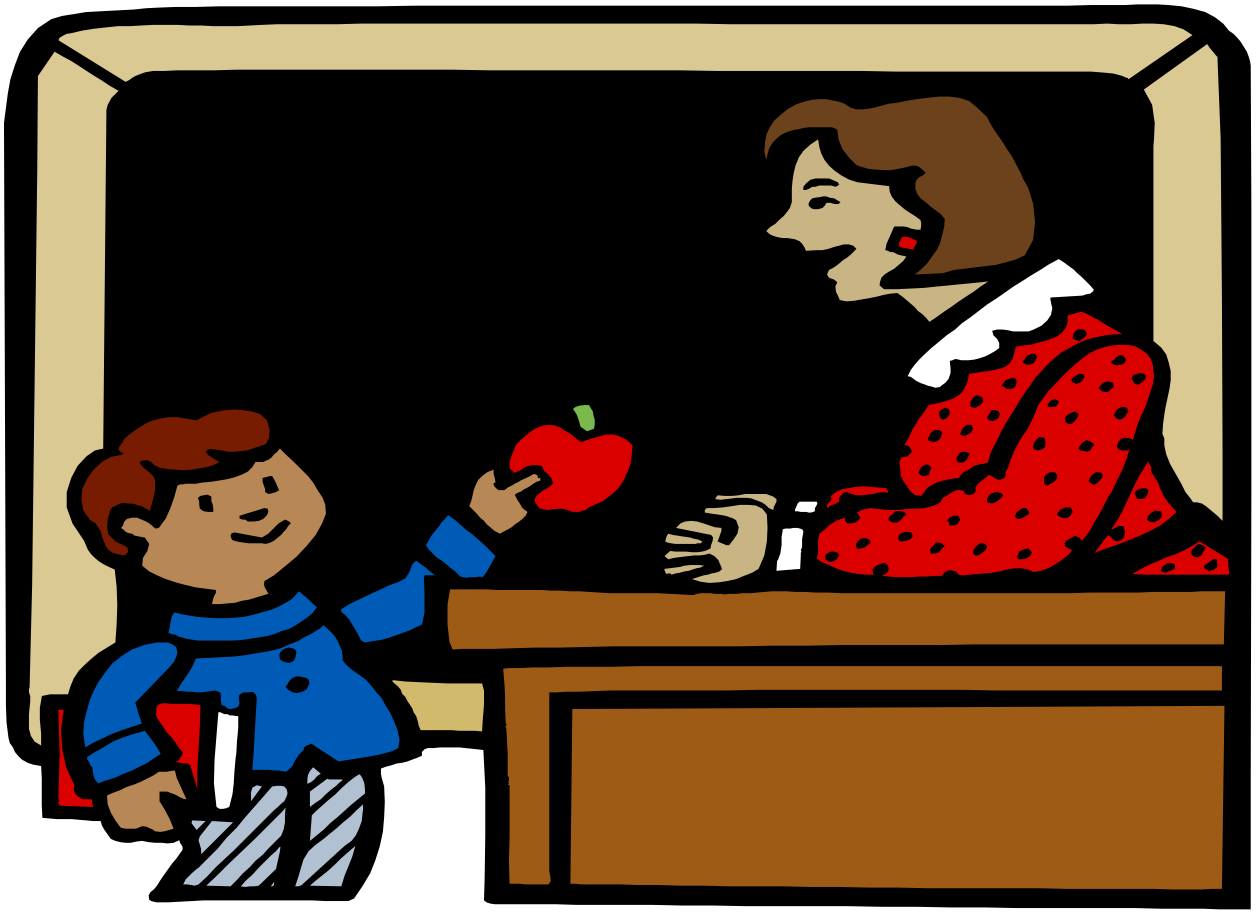
Remember you will be sharing your letter with the class.

Its all in the Advertising!!!

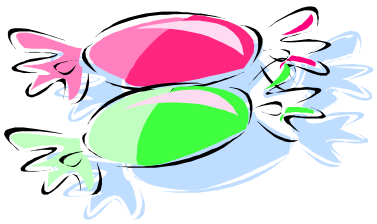
Your task is to create a quality, advertising brochure that would further convince the SweetPea Candy Company to select your candy bar. If you were the winner of the contest, this brochure would be used to promote the candy bar.

- You may create your brochure using a multi-media program or on paper using a variety of craft supplies.
- Your brochure should include the following components:
    - Advertising slogan
    - Name of the candy bar
    - Candy bar components
    - Illustration
    - Cost of production
- Your brochure should be created with pride. Neatness, color and creativity count!!!
- Each group will present their brochure to the class.
- Each group will formulate and direct questions to other groups about their publication.
- See scoring rubric for project scoring information.

Teacher Resource Pages



SweetPea Candy Contest



The SweetPea Candy Company is proud to announce its first annual candy creation competition. You will be a participant in the SweetPea Candy Contest where you will be challenged to create a new candy bar and persuade the company president that your bar should be selected as the winner. To accomplish this you will complete a variety of tasks. Your final performance task will involve generating a business letter and advertising brochure rich with mathematical language and concepts.

Daily Reflections

Frequency Table

Title

Topic	Tallies	Frequency
Option 1	III	3
Option 2		
Option 3		

Frequency Tables are in **three** sections.

Section 1 is your TOPIC

Section 2 is the number of times your topic is selected
Each time someone is asked a question in your interview you will make a tally mark

Section 3 is where you add all of your tally marks up for each row

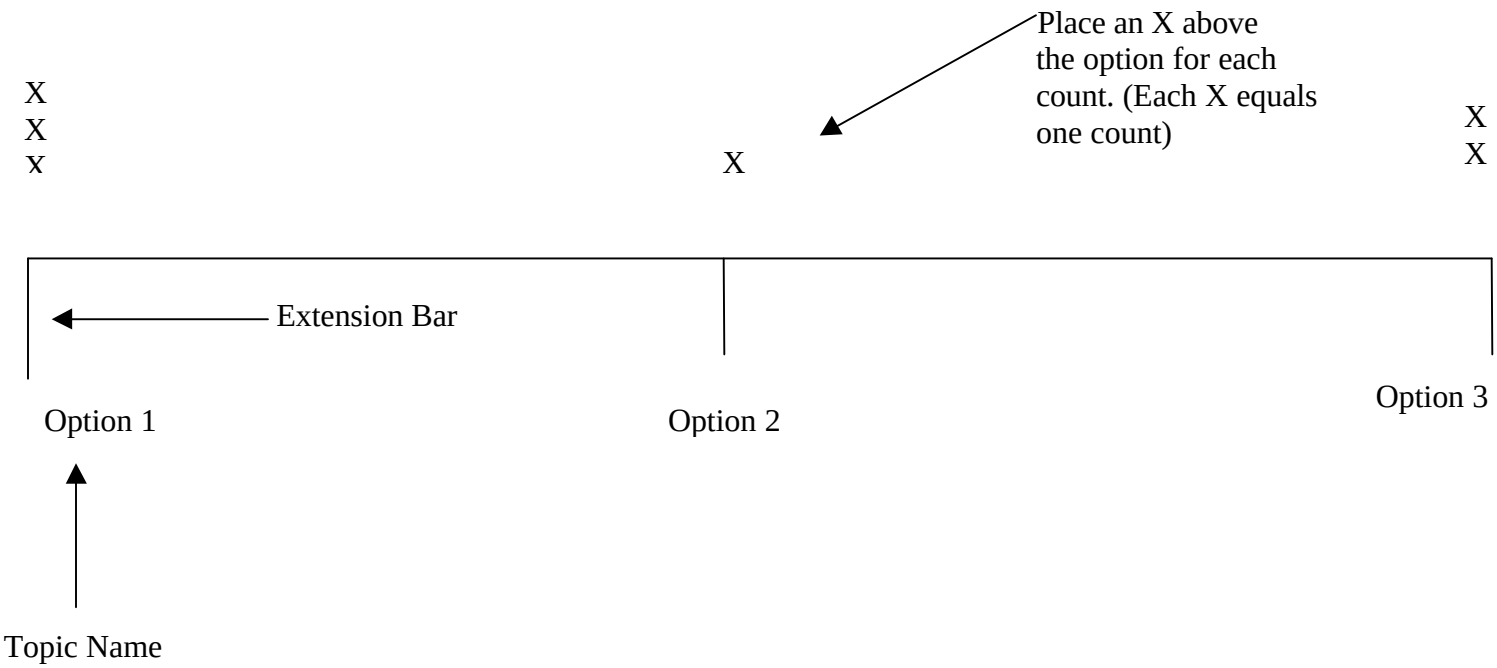
REMEMBER

- Always have a heading for your table.
- Each section must have a label.

Daily Reflections

Line Plots

TITLE



Line Plots are very similar to number lines.

- Draw your line and give each extension bar a label.
- On top of the extension mark an X above the topic when it is used
- Include a Title

Remember

- Line Plots should always have a title.
- Each extension bar should always include a label.

Daily Reflections

Conversions

Fractions to Decimals

½ = .50

Divide the numerator (top number) by the denominator (bottom number).

$$
\begin{array}{r}
.5 \\
2\overline{)\,1.0} \\
\underline{1\;0} \\
0
\end{array}
$$

Daily Reflections

Conversions

Decimal to Percent

Multiply the decimal by 100. In the product, move the decimal point to the left the same number of places that appears to the right of the decimal point(s) in the factors of the problem.

$$\begin{array}{r} 100 \\ \times\ .50 \\ \hline 5000 \end{array}$$ } factors

*5 0 0 0.

*5 0 0. 0

*5 0. 0 0 = 50%

Daily Reflections

Conversions

Percents to decimals

Always move the decimal point two places to the left. (NOTE: If the decimal point is not seen, then it always appears behind the digit just before the percent symbol.)

50%

5 0.

5 . 0

.5 0

.50

Daily Reflections

Multiplication

Multiplying a decimal and a decimal

$$\begin{array}{r} 1.20 \\ \times\ .25 \\ \hline 600 \\ +240 \\ \hline 3000 \end{array}$$ } factors

3 0 0 0. → 3 0 0. 0 → 3 0. 0 0 → 3. 0 0 0

.3000

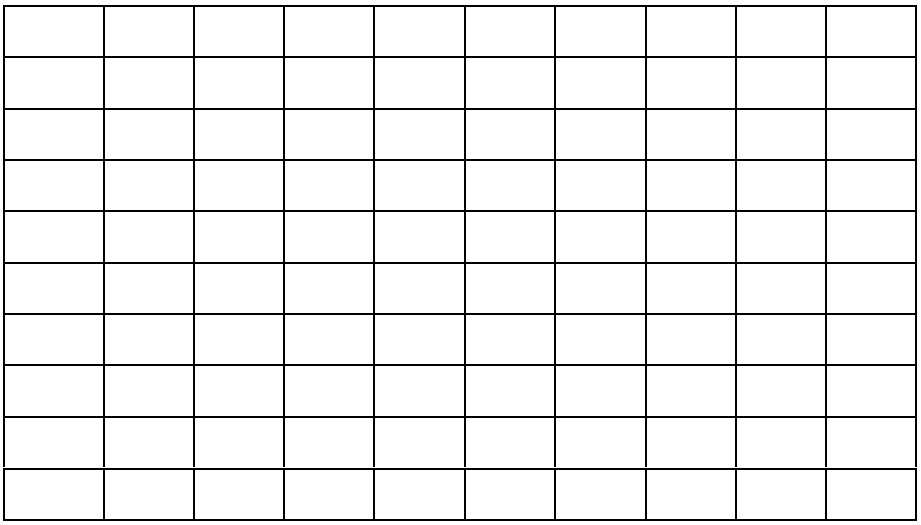
Multiply as usual. Move the decimal point to the left the same number of places that appears to the right of the decimal point(s) in the factors of the problem.

Daily Reflections

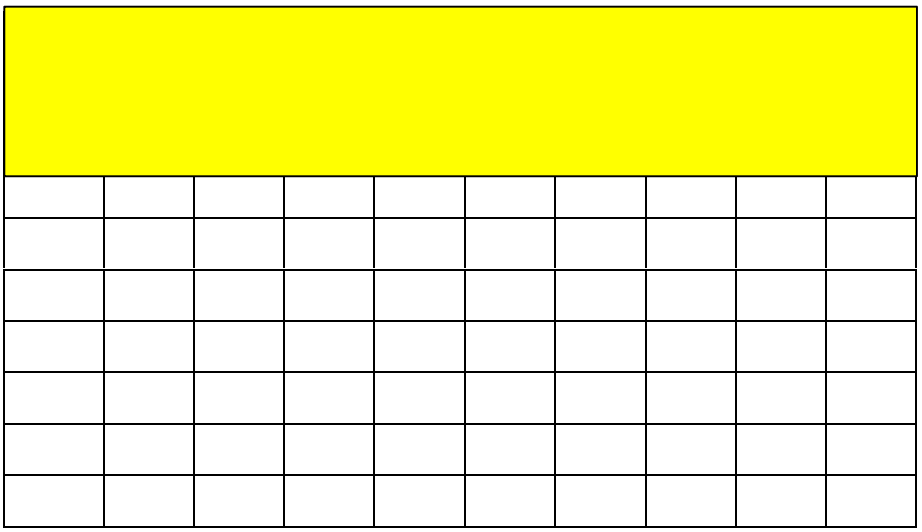
Hundreds Charts

Hundreds charts are divided into 100 equal squares. In order to represent a decimal on a hundreds chart, color or shade the decimal number. This always works because decimals are fractional parts of 100.

Represent .30



Blank Chart



30 boxes are shaded to represent .30 or 30%.

Daily Reflections

Business Letter Format

(Heading-your address and the date)
Street Address or post office box number
City / town, State Zip Code
Month Day, Year

(Inside Address-Who you are writing to)
Person's Name
Company Name
Street address or post office box
City/Town, State Zip Code

(Salutation)
Dear Sir, Madam, or persons name if known

(Body)
Letter content and information

Yours truly,
(Signature-sign your name)

(Type your name below signature)

Daily Reflection

Sample Business Letter

3207 McKelvey Blvd.
St.Ann, Mo 76857
June 13, 2008

Mr. Jonathan Franklin
Shobo Noodle Company
145 Front Street
Boston, Ma 45636

Dear Mr. Franklin,

I wanted to take this opportunity to thank you for your generous donation to our community homeless shelter. Your care and concern has made a difference in the lives of many of our community members.

Thank you,

(Signature here)

Helen Trinton

Daily Reflection

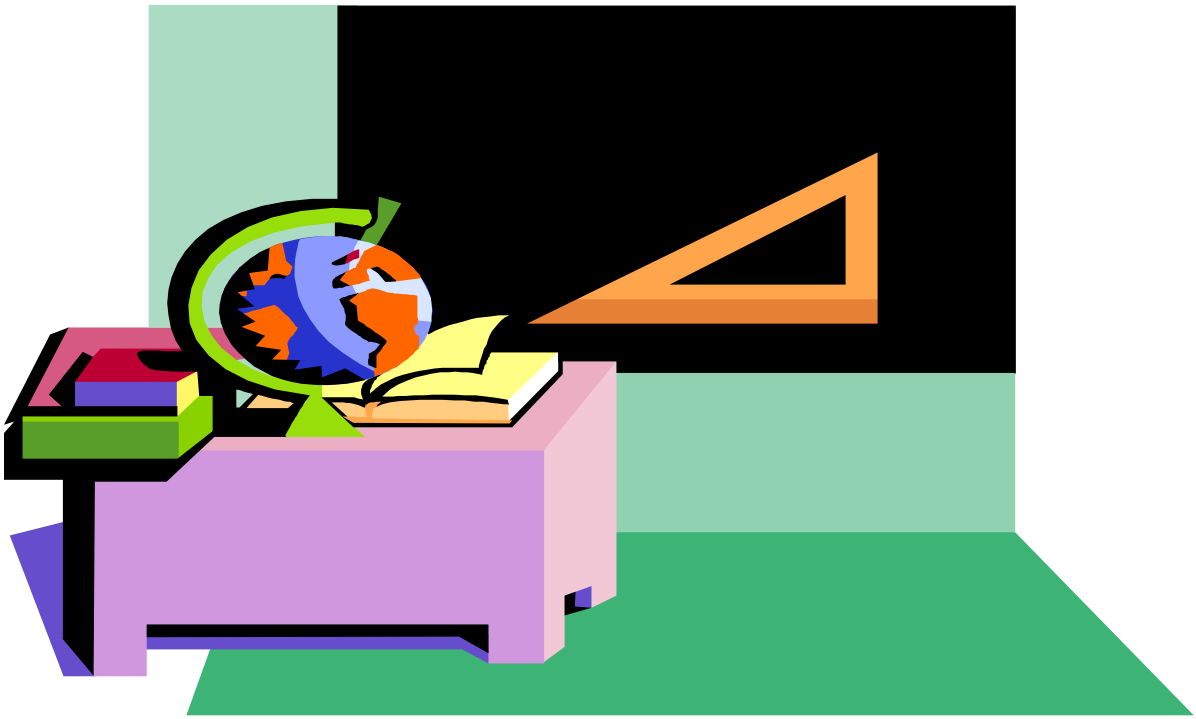
Brochure Components

When creating your advertising brochure please remember to include the following components:

- Advertising Slogan
- Name of Candy Bar
- Candy Bar Components
- Illustrations
- Cost of production

All work should be completed with pride. Neatness, color and creativity count!!!!

Scoring Rubrics



Data Dilemma Frequency Table Rubric

Student Name _____

CATEGORY	4	3	2	1
Data Table	Data in the table is well organized, accurate, and easy to read.	Data in the table is organized, accurate, and easy to read.	Data in the table is accurate and easy to read.	Data in the table is not accurate and/or cannot be read.
Neatness and Attractiveness	Exceptionally well designed, neat, and attractive. Colors that go well together are used to make the graph more readable. A ruler and graph paper (or graphing computer program) are used to make the graph more readable.	Neat and relatively attractive. A ruler and graph paper (or graphing computer program) are used to make the graph more readable.	Lines are neatly drawn but the graph appears quite plain.	Appears messy and "thrown together" in a hurry. Lines are visibly crooked.
Title	Title is creative and clearly relates to the problem being graphed. It is printed at the top of the graph.	Title clearly relates to the problem being graphed and is printed at the top of the graph.	A title is present at the top of the graph.	A title is not present.
Labeling	All required labels are present.	Most required labels are present.	Some required labels are present.	None of the required labels are present.

It's all in the Name Rubric

Student Name _____

CATEGORY	4	3	2	1
Mathematical Errors	90-100% of the steps and solutions have no mathematical errors.	Almost all (85-89%) of the steps and solutions have no mathematical errors.	Most (75-84%) of the steps and solutions have no mathematical errors.	More than 75% of the steps and solutions have mathematical errors.
Explanation	Explanation is detailed and clear.	Explanation is clear.	Explanation is a little difficult to understand, but includes critical components.	Explanation is difficult to understand and is missing several components OR was not included.
Mathematical Reasoning	Uses complex and refined mathematical reasoning.	Uses effective mathematical reasoning	Some evidence of mathematical reasoning.	Little evidence of mathematical reasoning.

What's in it?

What's Rubric

Student Name _____

CATEGORY	4	3	2	1
Mathematical Errors	90-100% of the steps and solutions have no mathematical errors.	Almost all (85-89%) of the steps and solutions have no mathematical errors.	Most (75-84%) of the steps and solutions have no mathematical errors.	More than 75% of the steps and solutions have mathematical errors.
Mathematical Concepts	Explanation shows complete understanding of the mathematical concepts used to solve the problem(s).	Explanation shows substantial understanding of the mathematical concepts used to solve the problem(s).	Explanation shows some understanding of the mathematical concepts needed to solve the problem(s).	Explanation shows very limited understanding of the underlying concepts needed to solve the problem(s) OR is not written.
Strategy/Procedures	Typically, uses an efficient and effective strategy to solve the problem(s).	Typically, uses an effective strategy to solve the problem(s).	Sometimes uses an effective strategy to solve problems, but does not do it consistently.	Rarely uses an effective strategy to solve problems.

Equivalencies in Writing Rubric

Student Name _____

CATEGORY	4	3	2	1
Justification	Mathematical conclusions are stated in clear and accurate math language utilizing supporting facts from data.	Most mathematical conclusions are stated in clear and accurate math language utilizing supporting facts from data.	Some mathematical conclusions are stated in math language utilizing some supporting facts from data.	No mathematical conclusions are stated in clear and math language not used.
Mathematical Reasoning	Uses complex and refined mathematical reasoning.	Uses effective mathematical reasoning	Some evidence of mathematical reasoning.	Little evidence of mathematical reasoning.
Ideas	Ideas were expressed in a clear and organized fashion. It was easy to figure out what the letter was about.	Ideas were expressed in a pretty clear manner, but the organization could have been better.	Ideas were somewhat organized, but were not very clear. It took more than one reading to figure out what the letter was about.	The letter seemed to be a collection of unrelated sentences. It was very difficult to figure out what the letter was about.
Mechanics	No errors in spelling, grammar, capitalization or punctuation.	Two or fewer errors in spelling, capitalization or punctuation.	Three or four errors in spelling, grammar, capitalization or punctuation.	More than four errors in spelling, grammar, capitalization or punctuation.
Sentences & Paragraphs	Sentences and paragraphs are complete, well constructed and of varied structure.	All sentences are complete and well constructed (no fragments, no run-ons). Paragraphing is generally done well.	Most sentences are complete and well constructed. paragraphing needs some work.	Many sentence fragments or run-on sentences OR paragraphing needs lots of work.

Tell Me About It Business Letter Rubric

Student Name _____

CATEGORY	4	3	2	1
Format	Complies with all the requirements for a business letter.	Complies with 85% of the requirements for a business letter.	Complies with 70%of the requirement for a business letter.	Complies with less than 70% of the requirements for a business letter.
Mechanics	No errors in spelling, grammar, capitalization or punctuation.	Two or fewer errors in spelling, capitalization or punctuation.	Three or four errors in spelling, grammar, capitalization or punctuation.	More than four errors in spelling, grammar, capitalization or punctuation.
Content Accuracy	The letter contains at least 10 accurate facts about the topic.	The letter contains 8-9 accurate facts about the topic.	The letter contains 6-7 accurate facts about the topic.	The letter contains fewer than 6 accurate facts about the topic.
Sentences & Paragraphs	Sentences and paragraphs are complete, well constructed and of varied structure.	All sentences are complete and well constructed (no fragments, no run-ons). Paragraphing is generally done well.	Most sentences are complete and well constructed. paragraphing needs some work.	Many sentence fragments or run-on sentences OR paragraphing needs lots of work.
Neatness	Letter is typed neatly and is easy to read with no distracting error corrections. It was done with pride.	Letter is neatly hand-written, clean, not wrinkled, and is easy to read with no distracting error corrections. It was done with pride.	Letter is typed or written, is crumpled or slightly stained. It may have 1-2 distracting error corrections. It was done with some care.	Letter is typed or written, is crumpled or stained. It may have several distracting error corrections. It looks like it was done in a hurry.
Length	The letter is 10 or more sentences.	The letter is 8-9 sentences.	The letter is 5-7 sentences.	The letter is less than 5 sentences.
Ideas	Ideas were expressed in a clear and organized fashion. It was easy to figure out what the letter was about.	Ideas were expressed in a pretty clear manner, but the organization could have been better.	Ideas were somewhat organized, but were not very clear. It took more than one reading to figure out what the letter was about.	The letter seemed to be a collection of unrelated sentences. It was very difficult to figure out what the letter was about.

Multimedia Brochure Rubric

Student Name _____

CATEGORY	4	3	2	1
Component Requirements (Title, Slogan, Name, Cost)	All requirements are met or exceeded	All requirements are met	One requirement was not completely met.	More than one requirement was not completely met.
Creativity	Product shows a large amount of original thought. Ideas are creative and inventive.	Product shows some original thought. Work shows new ideas and insights.	Uses other people's ideas (giving them credit), but there is little evidence of original thinking.	Uses other people's ideas, but does not give them credit.
Graphics	Include three graphics.	Includes two graphics.	Includes one graphic	No graphics utilized
Neatness and Color	Makes excellent use of font, color, effects, etc. to enhance to presentation.	Makes good use of font, color, effects, etc. to enhance to presentation.	Makes use of font, color, effects, etc. but occasionally these detract from the presentation content.	Use of font, color, effects etc. but these often distract from the presentation content.
Workload	The workload is divided and shared equally by all team members.	The workload is divided and shared fairly by all team members, though workloads may vary from person to person.	The workload was divided, but one person in the group is viewed as not doing his/her fair share of the work.	The workload was not divided OR several people in the group are viewed as not doing their fair share of the work.
Mechanics	No misspellings or grammatical errors.	Two or fewer misspellings and/or mechanical errors.	Three misspellings and/or grammatical errors.	Four or more errors in spelling or grammar.
Oral Presentation	Interesting, well rehearsed with smooth delivery that holds audience attention.	Relatively interesting, rehearsed with a fairly smooth delivery that usually holds audience attention.	Delivery not smooth, but able to able to hold audience attention most of the time.	Delivery not smooth and audience attention lost.

Brochure Rubric

Student Name _____

CATEGORY	4	3	2	1
Component Requirements (Title, Slogan, Name, Cost)	All requirements are met or exceeded	All requirements are met	One requirement was not completely met.	More than one requirement was not completely met.
Creativity	Product shows a large amount of original thought. Ideas are creative and inventive.	Product shows some original thought. Work shows new ideas and insights.	Uses other people's ideas (giving them credit), but there is little evidence of original thinking.	Uses other people's ideas, but does not give them credit.
Illustration	Includes three neat and colorful illustrations.	Includes two neat and colorful illustrations.	Includes one neat and colorful illustration.	No illustrations utilized or illustrations lack neatness and color.
Neatness and Color	Makes excellent use of color, penmanship, effects, etc. to enhance to presentation.	Makes good use of penmanship, color, effects, etc. to enhance to presentation.	Makes use of penmanship, color, effects, etc. but occasionally these detract from the presentation content.	Use of penmanship, color, effects etc. but these often distract from the presentation content.
Workload	The workload is divided and shared equally by all team members.	The workload is divided and shared fairly by all team members, though workloads may vary from person to person.	The workload was divided, but one person in the group is viewed as not doing his/her fair share of the work.	The workload was not divided OR several people in the group are viewed as not doing their fair share of the work.
Mechanics	No misspellings or grammatical errors.	Two or fewer misspellings and/or mechanical errors.	Three misspellings and/or grammatical errors.	Four or more errors in spelling or grammar.
Oral Presentation	Interesting, well rehearsed with smooth delivery that holds audience attention.	Relatively interesting, rehearsed with a fairly smooth delivery that usually holds audience attention.	Delivery not smooth, but able to able to hold audience attention most of the time.	Delivery not smooth and audience attention lost.